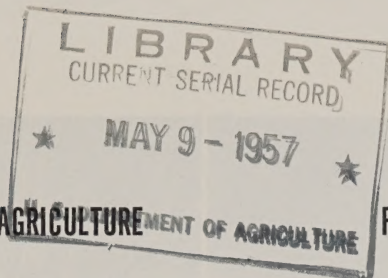


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# The Red-Headed Pine Sawfly

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The red-headed pine sawfly (*Neodiprion lecontei* (Fitch)) is one of the most important insects affecting young, natural hard pine stands and plantations throughout the eastern half of the United States and Canada. Trees from 1 to 15 feet in height are preferred, and therefore forest plantations and roadside plantings may suffer heavy damage. Although this insect was described in 1858, serious outbreaks and tree mortality were not generally known until the establishment of pure pine plantations became common about 40 years ago. The stepped-up planting program by the Civilian Conservation Corps in the 1930's added "fuel to the fire," and during the past 20 years outbreak conditions have been common in the North Central, Eastern, and Southern States.

## Host Trees

Generally speaking, defoliation by the sawfly is restricted to the 2- and 3-needled pines. In various parts of the insect's range, certain host species are favored and may be completely stripped of needles before other species are attacked. By regions, the preferred hosts are: Lake States, jack and red pines; Central States, shortleaf pine; Northeastern States, red pine;

Southern States, shortleaf, loblolly, longleaf, and slash pines; Canada, red pine. Almost all the other hard pines, native and exotic, are subject to attack when planted within the range of the insect. The 5-needled eastern white pine, Norway spruce, and tamarack may also be attacked if they are growing with a preferred host.

## Injury

The larvae feed in groups, and reddish strawlike needles give evidence of early larval feeding damage (fig. 1, *Left*). As a group of larvae grows older, it will eat all of the foliage on a branch before it moves to another (fig. 1, *Right*). Although the older foliage is preferred, new needles and even the tender bark of new twigs are eaten later in the summer. When a tree has been completely defoliated, the developing larvae migrate to nearby hard pines or other conifers. Defoliation of a secondary host may be very severe, because these larger larvae are voracious feeders. Heavy defoliation will cause reduced growth of a tree, and complete defoliation will kill it. Pines planted under hardwoods or in sand-blow and poor-survival areas are particularly subject to severe defoliation injury.

<sup>1</sup> Maintained by the Forest Service, U. S. Department of Agriculture, in cooperation with the University of Minnesota, St. Paul 1, Minn.





Figure 1.—Left, Reddish strawlike remains of needles indicate feeding by young red-headed pine sawfly larvae. Right, A group of larvae feeding on the needles at the tip of a branch.

## Description

Adult sawflies have 4 wings and are about  $\frac{1}{4}$  to  $\frac{3}{8}$  inch long. The female is rather heavy bodied; her head and the upper portion of the thorax are reddish brown, and the abdomen is generally blackish; her antennae are slender and notched. The male is smaller, is entirely black, and has feathery antennae. The newly hatched larva is whitish with a brownish head. As it feeds and develops, the body becomes yellowish and six rows of conspicuous black spots appear. When full grown, a larva is almost 1 inch long and has a red head.

## Life History

The sawfly larva spends the winter as a prepupa in a cocoon in the litter or topsoil beneath the infested trees. The cocoon, in which

transformation to the adult takes place, is a tough, reddish-brown capsule from  $\frac{5}{16}$  to  $\frac{7}{16}$  inch long. With warm spring weather, pupation occurs and most of the adults emerge. Egg laying begins in a short time. The whitish, translucent eggs are laid individually in slits or pockets cut in the tree's needles; they are usually grouped on the needles of a single twig, as many as 35 eggs being laid in a needle. Each female lays from 100 to 140 eggs and they hatch in 3 to 5 weeks depending on locality and weather conditions. A larva becomes full grown in 25 to 30 days, and then drops to the ground and spins its cocoon.

Adults continue to emerge throughout the summer and colonies of different ages may be found at the same time until late in the fall. Some of the prepupae may remain in diapause for several years. In



Canada and the northern part of the United States there is one generation annually. A few second generation adults may appear in Lower Michigan and New York. In southern Illinois two generations and a partial third may occur, while in the South there may be four or five generations (fig. 2).

### Control

Preventing the development of harmful sawfly populations is the goal toward which forest managers and plantation owners should strive. Ideally, this can be accomplished through careful selection and preparation of planting sites and

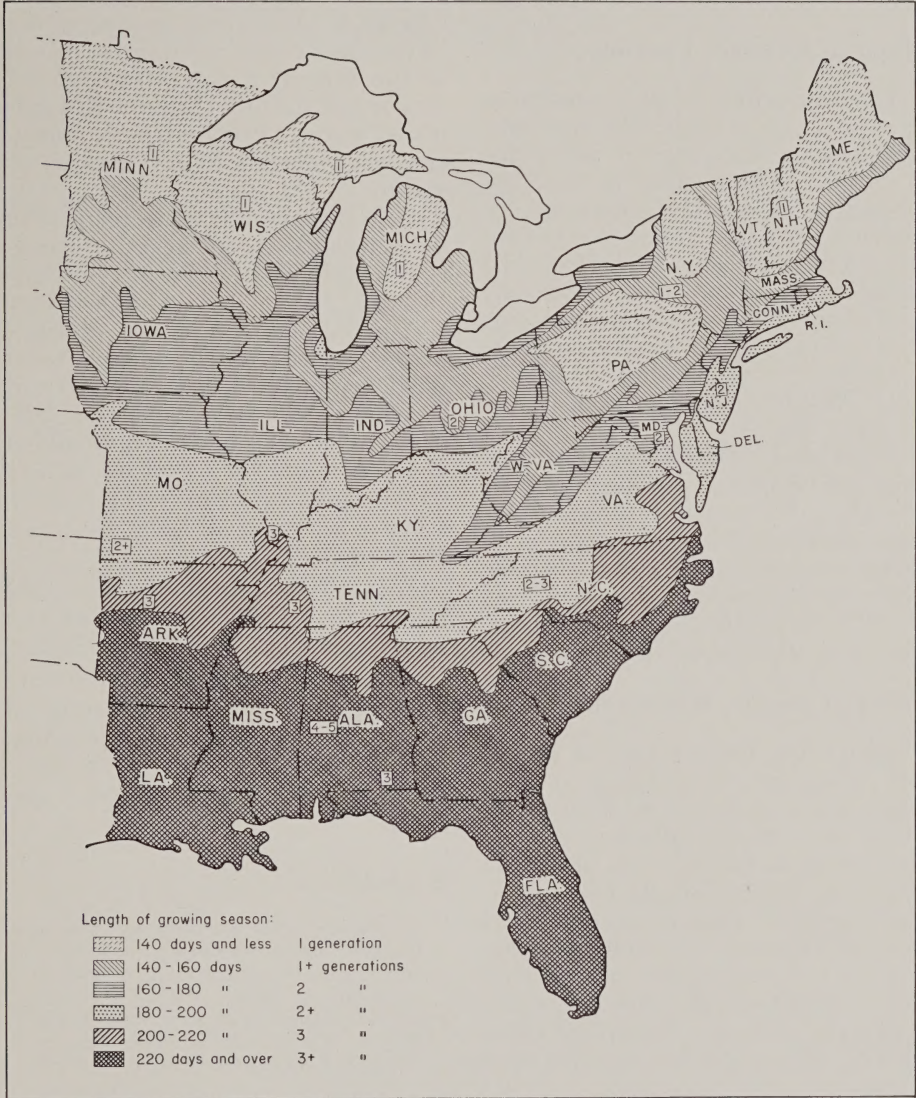


Figure 2.—Predicted number of generations per year, based on growing season.

through proper maintenance of the plantation in its early years. Susceptible tree species should not be planted under hardwoods or in sand blows, and areas of poor survival should be replanted to maintain good stocking. When susceptible tree species are planted, the stands should be watched and direct control measures carried out if damaging sawfly populations develop.

### Natural Control Factors

Outbreaks of the red-headed pine sawfly occur periodically and subside after a few years of heavy defoliation. The decline of these infestations is greatly influenced by rodents that destroy large numbers of cocoons; diseases that often kill tremendous populations of larvae; and prolonged periods of high summer temperatures, or low temperatures and wet snowstorms in the early fall, that cause the death of many larvae.

Fifty-eight species of parasites and predators have been reared in the United States and Canada. An egg parasite, *Olostrocercus cinctipennis* Ashm., and the larval parasites, *Spathimeigenia spinigera* Tns. and *Phorocera hamata* A. & W., are the most important.

### Direct Control Measures

If only a few groups of larvae are present on roadside or ornamental trees or on individual trees in a young plantation, they can be picked or shaken from the trees and destroyed. In heavier infestations in such areas chemical control measures (to which the larvae of the red-headed pine sawfly are very susceptible) are necessary. The insecticide can be applied effectively with a garden or knapsack

sprayer. Spraying should be done as soon as the larvae have hatched and begun to feed. Among the newer insecticides, DDT has proved very effective. Since a heavy dosage with an oil solution may burn the pine foliage, a 6-percent emulsion is recommended. Sawflies can also be effectively controlled with benzene hexachloride (BHC) or its gamma isomer, lindane. For use in knapsack or garden sprayers, the latter insecticide should be mixed at the rate of  $2\frac{1}{2}$  teaspoonfuls of 25-percent wettable lindane in a gallon of water. For hydraulic sprayers, use 1 pound in 100 gallons of water.

Infestations in large acreages can be controlled by an aerial application of a DDT oil solution containing  $12\frac{1}{2}$  percent of DDT at a dosage of 1 gallon per acre. Two solutions are suggested: (1) 1 pound of technical grade DDT in  $1\frac{1}{4}$  quarts of auxiliary solvent (Sovacide PB-544C or equal) to which is added  $2\frac{5}{8}$  quarts of No. 2 fuel oil, or (2) 2 quarts of 25-percent DDT concentrate to which is added 2 quarts of No. 2 fuel oil.

**CAUTION:** DDT and BHC are poisonous. Follow directions and heed precautions given on their containers, and store them in plainly labeled containers away from all food products. In forest spraying, avoid overdosing with DDT, especially over streams, ponds, and lakes.

### References

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